

Aligning Your Manufacturing Capability - A Seminar for Manufacturers

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Seneca Industry Innovation

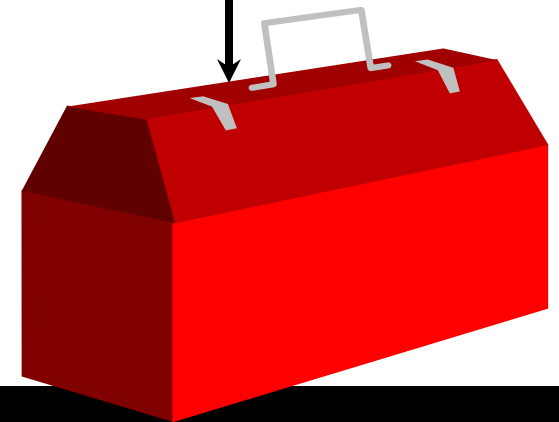


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Process Alignment Methodology defined

Quick identification of processes' performance, its required level of *business compliance* and the proper configuration of the supporting technology, to *effectively and efficiently support* the company's declared strategy

Alignment Definition:
Are we using the right
set of tools from
the tool box ?



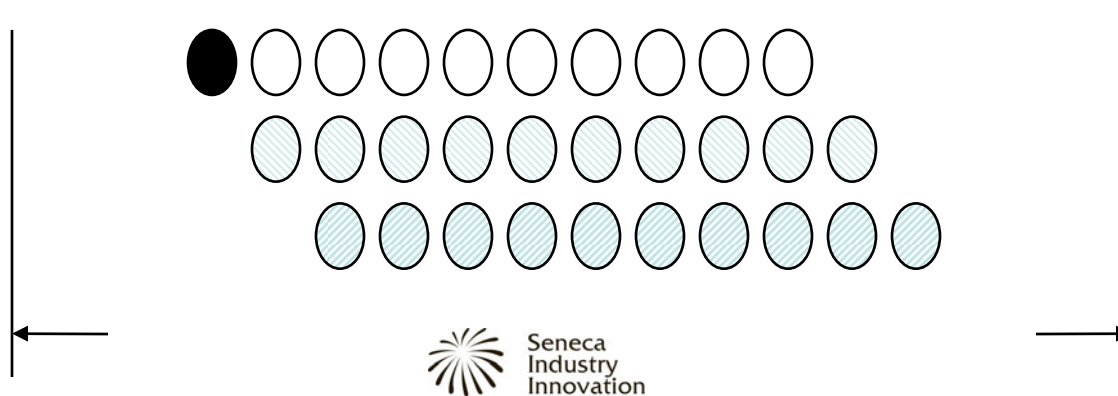
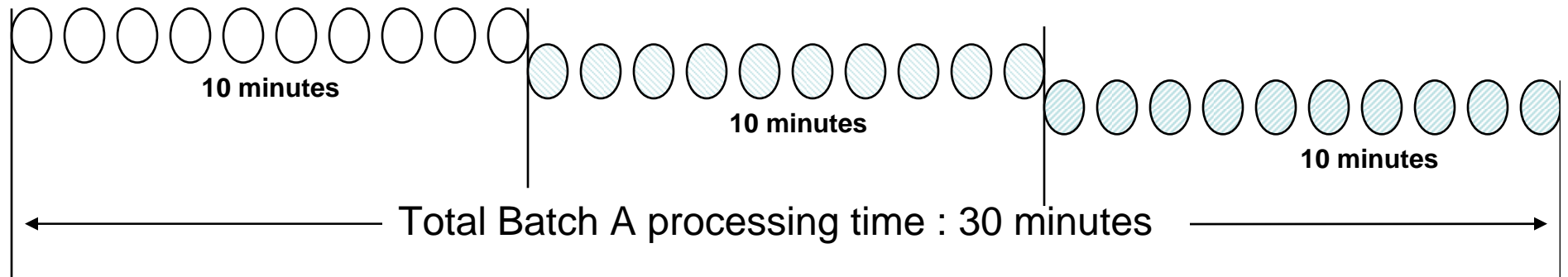
Process View of Organizations: Process attributes

- Process performance
 - Efficiency or internal performance: Ability of the process to develop, produce and deliver products or services at the lowest possible cost/effort
 - Effectiveness or external performance: Ability of the process to meet customers' demand in terms of their exact quality, quantity, time, and location requirements

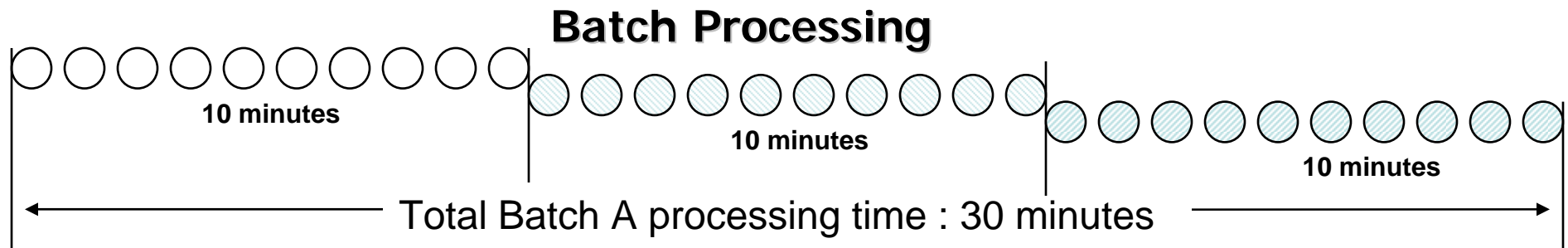


Continuous Flow Processing

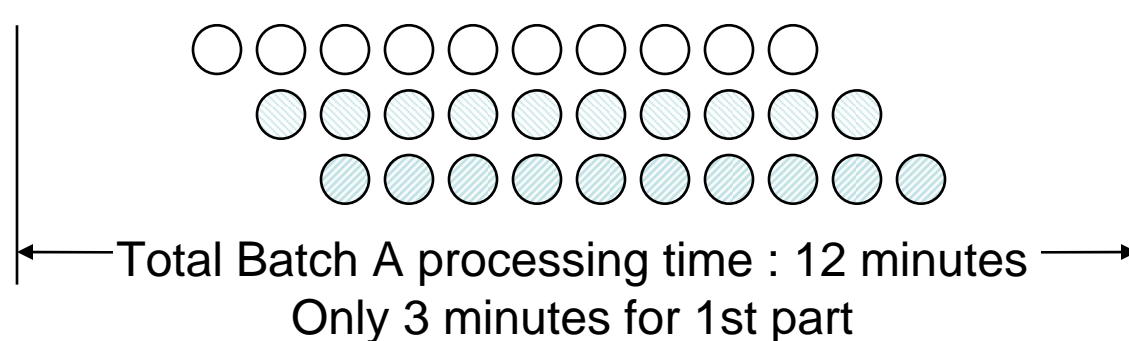
Batch Processing



Continuous Flow Processing



Continuous Flow Processing

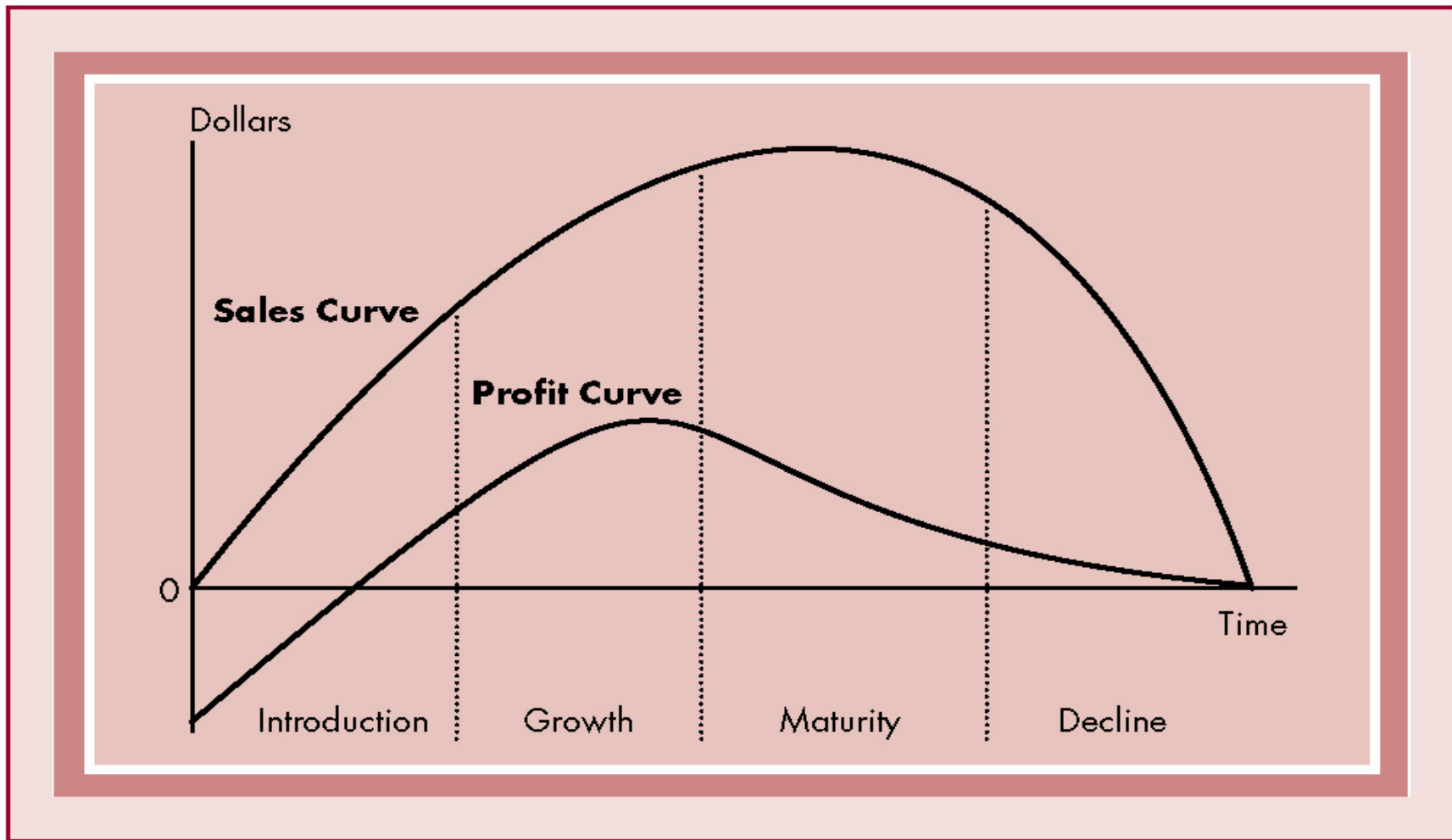


Maintaining Competitive Advantage

- **Competitive advantage has a life cycle**
 - Launch
 - Exploitation
 - Erosion
- **Products/services have life cycle**
 - Introduction
 - Growth
 - Maturity
 - Decline
 - Death/extinction



Product Life Cycle



Strategic options

- **Premium prices/high quality**
 - Is there a market for it?
- **Cost-advantage strategy**
 - Low-cost producer
 - Is the market price sensitive?
- **Marketing advantage strategy**
 - Product/service differentiation
- **Commodity pricing**
- **Marketing mix: Price, Product, Promotion and Place – The Four P's**



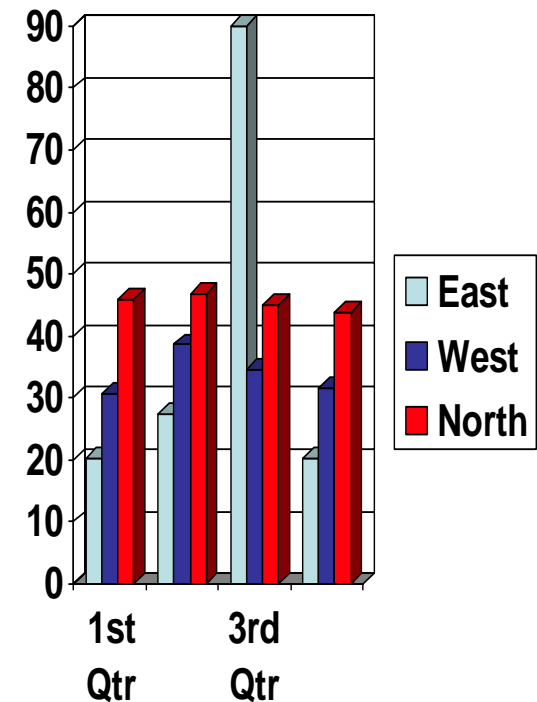
Manufacturing Strategies (translating the four P's)

- Cost-efficiency
- Quality
- Dependability/Availability
- Flexibility
- Service (during and after)



Process Alignment

- We must start by understanding the product positioning in your business
- Product Life Cycle analysis
- New, mature or declining products?



Process Alignment

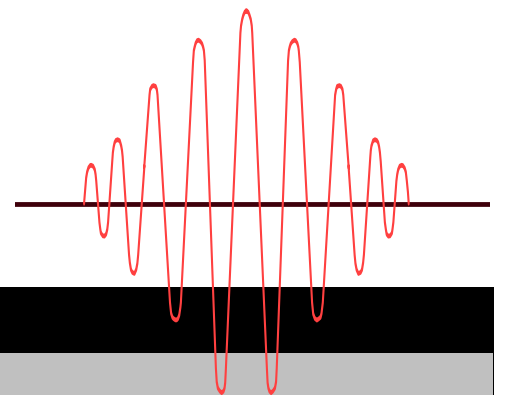
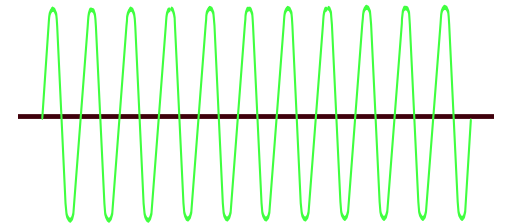
What are your critical processes?

- Purchasing?
- Sales Analysis?
- Forecasting?
- Order Entry?
- Financial Reporting?
- Demand Analysis?
- Budgeting?
- Product Delivery?
- Manufacturing Costing?



So How Well Aligned Are You?.

- Is process flexibility required?
- Is cost efficiency required?
- Is shorter cycle time a must?
- How close to a continuous flow/just in time/ Kanban system does my process have to be?
- Is my cost structure flexible enough?



The Effect of Cost Structure on Profit Stability

	All Fixed Company	Combination Company	All Variable Company
Units Sold	10	10	10
Selling Price Per Unit	\$ 10	\$ 10	\$ 10
Variable Cost Per Unit	0	3	6
Sales Revenue	\$ 100	\$ 100	\$ 100
Total Variable Cost	0	(30)	(60)
Total Fixed Cost	(60)	(30)	0
Net Income	<u>\$ 40</u>	<u>\$ 40</u>	<u>\$ 40</u>

Now let's see what happens when the number of units sold increases.

The Effect of Cost Structure on Profit Stability

	All Fixed Company	Combination Company	All Variable Company
Units Sold	11	11	11
Selling Price Per Unit	\$ 10	\$ 10	\$ 10
Variable Cost Per Unit	0	3	6
Sales Revenue	\$ 110	\$ 110	\$ 110
Total Variable Cost	0	(33)	(66)
Total Fixed Cost	(60)	(30)	0
Net Income	<u>\$ 50</u>	<u>\$ 47</u>	<u>\$ 44</u>

The income increase is greater in the All Fixed Company.

The Effect of Cost Structure on Profit Stability

	All Fixed Company	Combination Company	All Variable Company
Units Sold	9	9	9
Selling Price Per Unit	\$ 10	\$ 10	\$ 10
Variable Cost Per Unit	0	3	6
Sales Revenue	\$ 90	\$ 90	\$ 90
Total Variable Cost	0	(27)	(54)
Total Fixed Cost	(60)	(30)	0
Net Income	<u>\$ 30</u>	<u>\$ 33</u>	<u>\$ 36</u>

Yes, the income decrease is greater in the All Fixed Company.

Using Fixed Cost to Provide a Competitive Operating Advantage

Consider the following two companies:

	MaHall All Fixed	Strike All Variable
Employee Hours Worked	2,000	2,000
Fixed Salaries	\$ 16,000	\$ 0
Wage Rate Per Hour	\$ 0	\$ 8
Service Revenue (\$11 per hour)	\$ 22,000	\$ 22,000
Total Cost	(16,000)	(16,000)
Net Income	<u>\$ 6,000</u>	<u>\$ 6,000</u>

What happens if each company cuts the service revenue to \$7 per hour in order to double the amount of business?


Using Fixed Cost to Provide a Competitive Operating Advantage

	MaHall All Fixed	Strike All Variable
Employee Hours Worked	4,000	4,000
Fixed Salaries	\$ 16,000	\$ 0
Wage Rate Per Hour	\$ 0	\$ 8
Service Revenue (\$7 per hour)	\$ 28,000	\$ 28,000
Total Cost	16,000	32,000
Net Income	<u>\$ 12,000</u>	<u>\$ (4,000)</u>

Advantage to MaHall, the all fixed company.

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Measuring Operating Leverage Using Contribution Margin




	Actual sales 5,000 Hammers
Sales	<u>\$ 50,000</u>
Less: variable expenses	<u>30,000</u>
Contribution margin	20,000
Less: fixed expenses	<u>15,000</u>
Net income	<u><u>\$ 5,000</u></u>

$$\text{Operating Leverage} = \frac{\$20,000}{\$5,000} = 4$$

A measure of how a percentage change in sales will effect profits.

Measuring Operating Leverage Using Contribution Margin

	Curent sales 5,000 Hammers	Increased sales 5,500 Hammers
		
Sales	\$ 50,000	\$ 55,000
Less: variable expenses	30,000	33,000
Contribution margin	20,000	22,000
Less: fixed expenses	15,000	15,000
Net income	\$ 5,000	\$ 7,000

A 10 percent increase in sales results in a 40 percent increase in net income.

$$(10\% \times 4 = 40\%)$$

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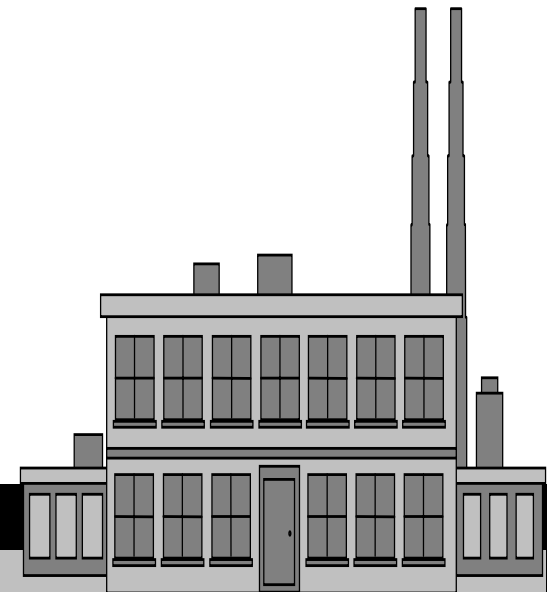
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Technology Positioning?

- **What are your products families from a process point of view?**
- **How repetitive and how discrete are your processes?**
- **How well aligned are your products with your technology?**



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Manufacturing Execution mode?

- **Make-to-stock or Make-to-order.**
- **Make-to-order or Assemble-to-order.**
- **Configure to order or Assemble-to-order.**
- **Common definition of manufacturing execution performance.**



Manufacturing Execution mode

- Simple plant making 3 products: A1 to A3
 - Plant capacity: 58 unit/day
- Average monthly demand:
 - A1= 600 ea
 - A2 = 200 ea
 - A3 = 500 ea



Manufacturing Execution mode

- Two opposite capacity execution approaches:
 - X: Make 600 A1, 200 A2, 500 A3 every month
 - Y: Make mixed model A (6 A1, 2 A2, 5 A3) 100 times in a month



Manufacturing Execution mode

- What happens after two weeks of production?:
 - X: 580 units of A1 available in inventory, 0 units of A2 and 0 units of A3
 - Y: 267 units of A1, 90 units of A2 and 223 units of A3



Performance criteria versus Capacity

- **Approach X Great for**
 - Traditional Full Utilization.
 - Low “absorbed” unit cost.
 - Operational efficiency.

- **Approach X Poor for**
 - Minimize Finished Goods inventory.
 - Minimize Manufacturing lead time.
 - Minimize WIP.
 - High Customer Service level

Performance criteria versus Capacity

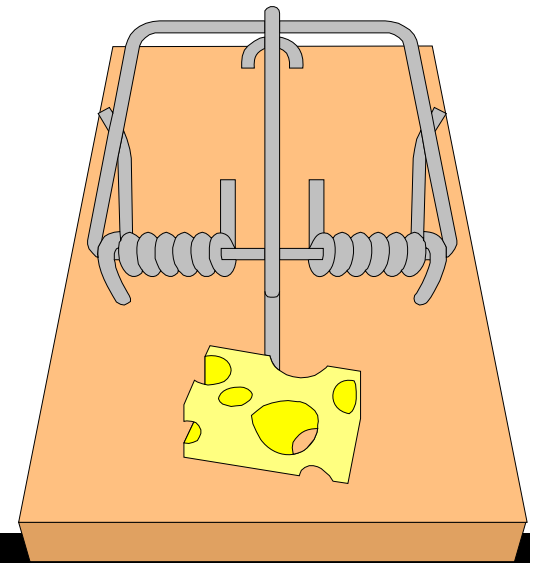
- **Approach Y Great for**
 - Minimize Finished Goods inventory.
 - Minimize Manufacturing lead time.
 - Minimize WIP.
 - Better Customer Service Level.

- **Approach Y Poor for**
 - Traditional Full Utilization.
 - Low “absorbed” unit cost.
 - Traditional operational “efficiency”.



Performance Criteria: Some Examples.

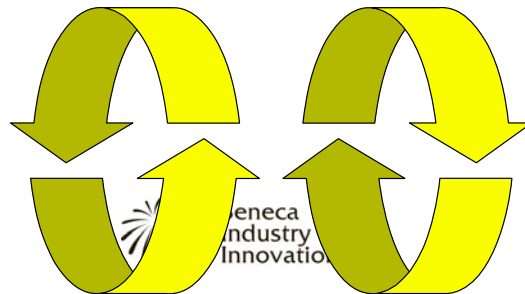
- Due Dates.
- Full Capacity Utilization.
- Minimize Flow time.
- Minimize WIP.
- Minimize Finished Goods inventory.
- Keep the warehouse full.
- Are priorities aligned to manufacturing strategy?



Inventory Turnover

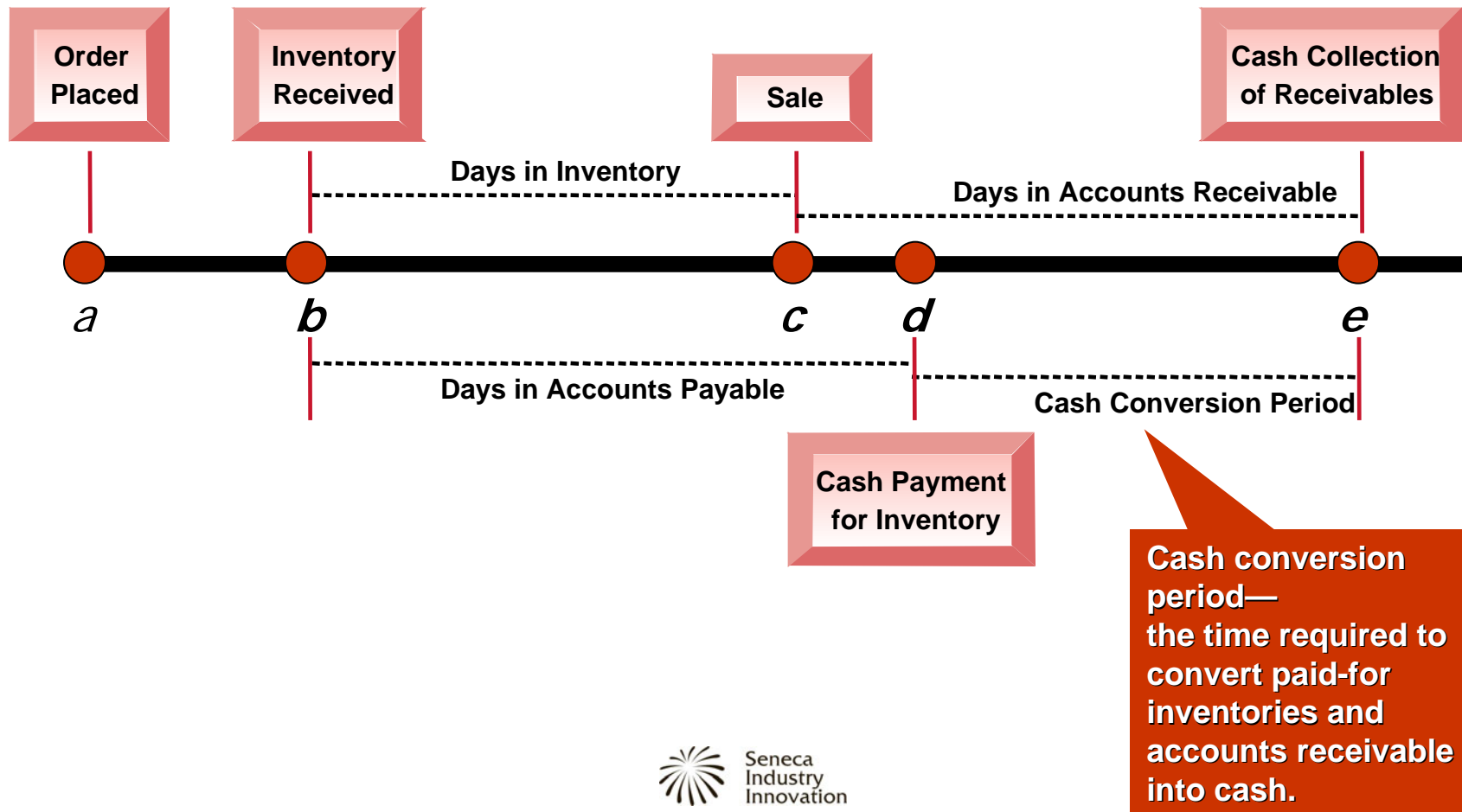
$$\text{Inventory Turnover} = \frac{\text{Cost of Goods Sold}}{\text{Average Inventory}}$$

This ratio measures how many times a company's inventory has been sold and replaced during the year.

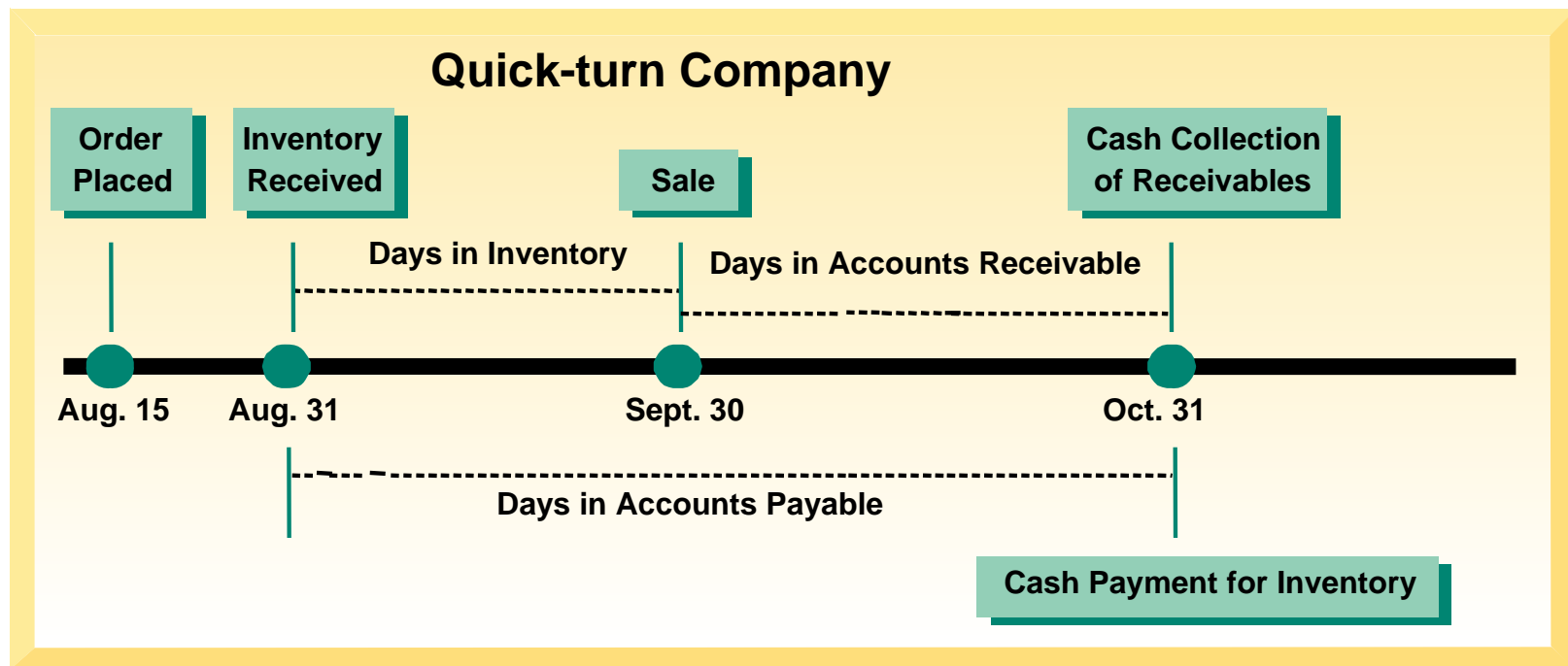


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Working-Capital Time Line



Working Capital Time Line for Quick-turn Company

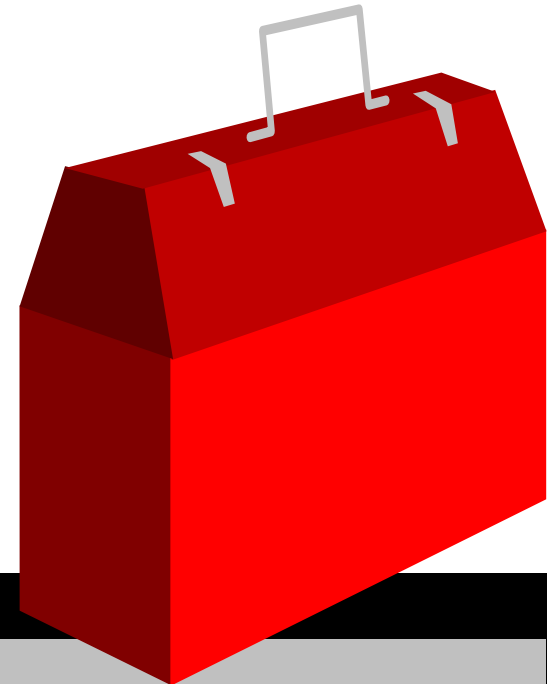


Understanding Your Dominant Product Flow.

- **V-Plants.**
 - One to many products relationship.
- **A-Plants.**
 - Many to few products relationship.
- **T-Plants.**
 - Few to many products relationship.

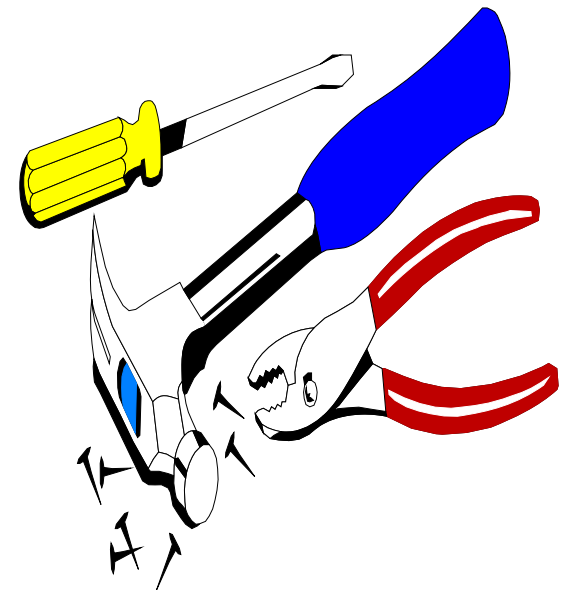


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Understanding your Shop Floor.

- **Machine Limited Systems.**
- **Labour Limited Systems.**
- **Flow Shop.**
- **Job Shop.**
- **Cellular Manufacturing.**
- **Mixed mode.**



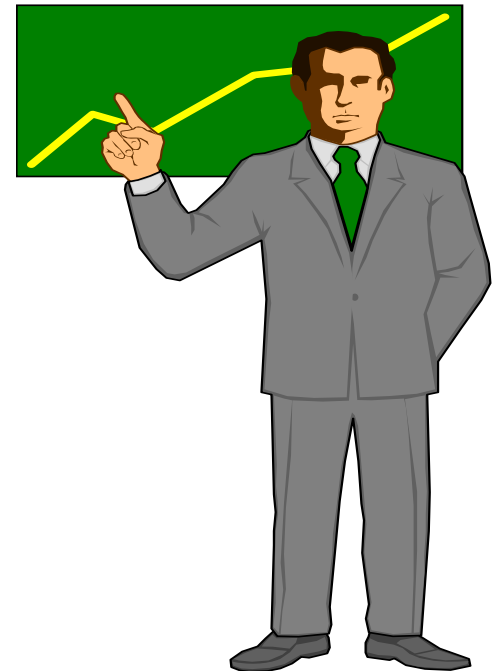
Understanding your Shop Floor.

- **Flow Shop:**

- Several products have identical task sequences.
- Job sequencing only needs to be evaluated at the beginning of the production line.

- **Job Shop:**

- Task sequence varies from product to product.
- Job sequencing must be evaluated at each work center.



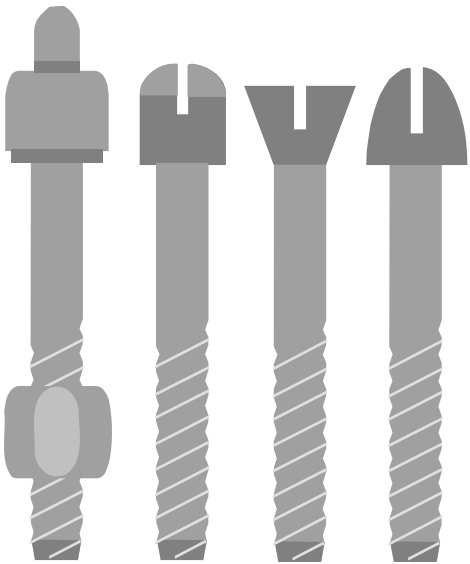
Product - Quantity Analysis

- **“Runners” (type A): High volume, frequent customer orders, stable demand**
 - Flow lines/cells, level rate production, capacity monitoring, Kan-ban scheduling
- **“Repeaters” (type B): Greater variety, less stable demand**
 - Not dedicated flow lines, capacity availability, Kan-ban/MRP scheduling
- **“Strangers” (type C): One-off items, infrequent demand**
 - MRP managing of materials and capacity availability



Understanding your Shop Floor.

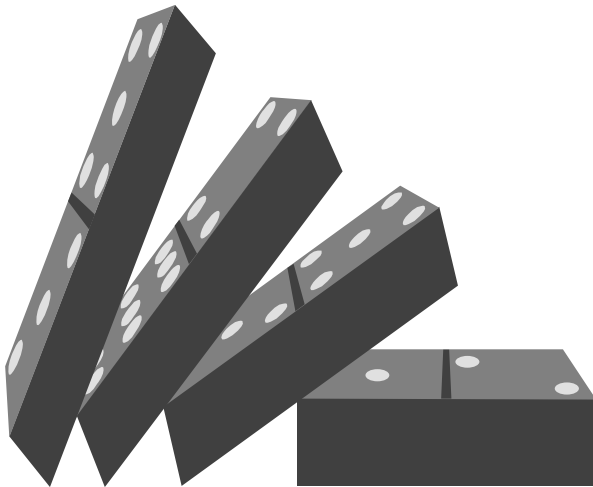
- **Cellular Manufacturing.**
 - Schedule jobs at the cell instead of individual work centers.
 - Each cell is a schedule release point.
 - Two stage scheduling.
 - First, the part family is scheduled.
 - Second, jobs within the family are scheduled.



Process Alignment

How well aligned are you? (between your processes and your strategy)

- Effectiveness test
- Efficiency test
- Alignment opportunities list
- Support technology requirements



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